# OPERATING SUMMARY

# NORTH BAY

AREA

water pollution control plant

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ONTARIO WATER RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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Water management in Ontario

Ontario Water Resources Commission 135 St. Clair Ave.W. Toronto 195 Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have cooperated in providing what we trust is an accurate and concise annual operating summary.

D.S. Caverly, General Manager. D. A. McTavish, P. Eng.,

Director,

Division of Plant Operations.

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Operations Engineer R. Kauppinen

135 St. Clair Avenue West Foronto 7

# NORTH BAY AREA water pollution control plant

operated for

THE CITY OF NORTH BAY

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

#### **DESIGN DATA**

PROJECT NO.

2-0010-58

TREATMENT

Activated Sludge

DESIGN FLOW

4.0 mgd

DESIGN POPULATION

50,000

BOD - Raw Sewage

150 mg/l:

Removal

85%

#### PRIMARY TREATMENT

#### Grit Removal

Type: Walker CRG

Size: Two  $11\frac{1}{2} \times 11\frac{1}{2} \times 2'(3,300 \text{ gal})$ 

Retention: 1.2 min

Flow Velocity: 0.163 fps

#### Comminution

- Two Griductors (Infilco)

#### Sewage Lift Pumps

Type: Chicago Pumps Size: Two 4 mgd (gas)

One 4 mgd (electric)

#### Primary Sedimentation

Type: Hardinge

Size: Three 90 X 30 X 10'

(0.505 mil gal)

Retention: 3 hr

Loading: Surface, 500 gal/ft<sup>2</sup>/day

Weir, 44,000 gal/ft/day

#### SECONDARY TREATMENT

#### Aeration Tanks

Type: Diffused air, single-pass

Size: Four 185 X 20 X 12'

(1.1 mil gal)

Retention: 6.4 hr

Loading: 4,200 lb BOD/day

#### Air Supply

Type: Roots

Size: Two 3750 cfm @ 7 psi

#### Diffusers

Type: Spargers

Spacing: 70 @ 22111)

14 @ 155/8") per tank

 $32 @ 13\frac{1}{2}")$ 

#### Secondary Sedimentation

Type: Walker RSX

Size: Two 60 X 60 X 11' (500, 000 gal)

Retention: 3 hrs

Loading: Surface, 550 gal/ft<sup>2</sup>/day

Weir, 8,000 gal/ft/day

#### CHLORINATION

Type: BIF semi-automatic

Size: One 500 lb/day

#### Chlorine Contact Chamber

Size: One 34' dia x  $12\frac{1}{2}$ ' (71,000 gal)

Retention: 25 min

#### OUTFALL

- 1000 ft into Lake Nippissing

#### SLUDGE HANDLING

#### Digestion System - Two-stage

Primary --

Type: Dorr (3 draft tube mixers)

Size: One 65' dia (70,000 cu ft or

0.436 mil gal)

Loading: 2.4 lb/cu ft/mo

#### Secondary --

Size: One 65' dia (74,000 cu ft or

0.46 mil gal)

Total Loading: 1.2 lb/cu ft/mo



#### GENERAL

The North Bay Water Pollution Control Plant is a secondary treatment plant with a design capacity of 4.0 million gallons per day. The plant is operated by a staff of seven.

The plant flows exceeded the design capacity of the plant most of the time in 1969. During the year, the firm of Gore & Storrie Limited revised a previous report on plant expansion. The new report, recommending an increase in the plant's capacity to 8.0 mgd, was received by the OWRC during the latter part of the year. The report was reviewed immediately, and preparation of a proposal to the City began. The proposal will provide for provincial ownership and operation of the existing facilities and proposed expansion.

A cleanout of the primary digester began in the latter part of the year and continued into 1970.

#### EXPENDITURES

The cost of operating the plant was \$121,522.69 compared to \$106,231.28 in 1968. The cost per million gallons treated was \$68.38 compared to \$68.74 in 1968. The main increases were in salaries and the cost of sludge hauling.

#### PLANT FLOWS and CHLORINATION

A total of 1,777.2 million gallons were treated during the year. This represents an average daily flow for the year of approximately 4.9 mgd compared to 4.2 mgd in 1968, an increase of approximately 17 percent.

The plant flow exceeded the design flow of 4.0 mgd approximately 73 percent of the time, 5.0 mgd 34 percent of the time and 6.0 mgd 14 percent of the time.

The plant effluent was chlorinated from April 1 to October 31. A total of 40,000 pounds of chlorine were used on 1,130.1 million gallons during this period to maintain and 0.5 mg/l chlorine residual in the final effluent.

#### PLANT EFFICIENCY

The raw sewage had an average concentration of 125 mg/l BOD and 193 mg/l suspended solids. The final effluent had an average concentration of 20 mg/l BOD and 43 mg/l suspended solids.

The average reduction in BOD was 84 percent and in suspended solids was 77 percent. These reductions were lower than generally expected for secondary treatment. The final effluent concentrations were above the OWRC objective of 15 mg/l for both BOD and suspended solids.

A total of 6,270 cubic feet of grit was removed for an average of 3.5 cubic feet of grit per million gallons treated.

#### AERATION

The primary effluent had an average BOD concentration of 88 mg/l and the average MLSS concentration was 1550 mg/l. This resulted in an average loading of 28 lbs. of BOD per 100 lbs. of MLSS or an F/M ratio of 0.28 An average of 2516 cubic feet of airwas used per pound of BOD removed.

#### SLUDGE DIGESTION and DISPOSAL

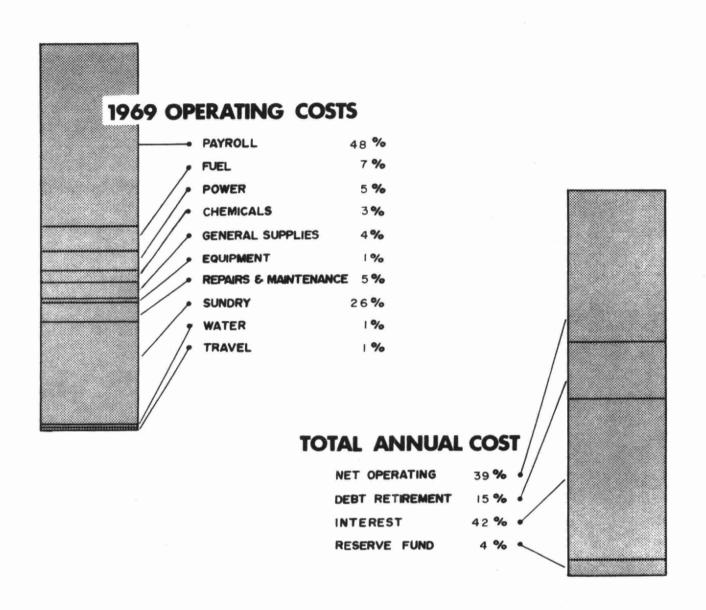
A total of 12, 150, 000 gallons of raw sludge was pumped at an average concentration of 4.1 percent solids. A total of 4, 560, 000 gallons of digested sludge at an average concentration of 6.7 percent solids was pumped from the digesters. This includes digested sludge removed from the primary digester during the cleanout of the primary digester. The digested sludge was removed by tank truck.

#### CONCLUSIONS

The plant operated on an average above the design capacity of 4.0 mgd and the resulting quality of the final effluent was not within OWRC objectives. The treatment capacity of the plant should be increased as is now being proposed.

## PROJECT COSTS

NET CAPITAL COST (Final) Long Term Debt to OWRC		\$2	, 314, 543, 73
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969		\$	<u>561, 264. 94</u>
Net Operating Debt Retirement Reserve Interest Charged		*	121, 522, 69 46, 708, 00 11, 298, 39 129, 549, 22
TOTAL		\$	309,078.30
RESERVE ACC	COUNT		
Balance @ January 1, 1969 North Bay West Ferris Widdifield	\$71, 375. 40 45, 479. 43 7, 927. 33	\$	124, 782.16
Deposited by Municipalities North Bay West Ferris Widdifield	\$11, 298. 39 - -	\$	11, 298, 39
Interest Earned North Bay West Ferris Widdifield	\$ 4,239.37 2,639.18 460.02	\$	<b>7,</b> 338 <b>.</b> 57
		\$	143, 419. 12
Less Expenditures			
Balance at December 31, 1969		\$	143, 419. 12



# **Yearly Operating Costs**

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	1380.0	\$ 79,171.60	\$57.37	6 cents
1966	1386.4	87, 375. 11	63.02	6 cents
1967	1438.2	94, 418. 15	65.65	4 cents
1968	1545.4	106, 231. 28	68.74	4 cents
1969	1777.2	121, 522.69	68.38	7 cents

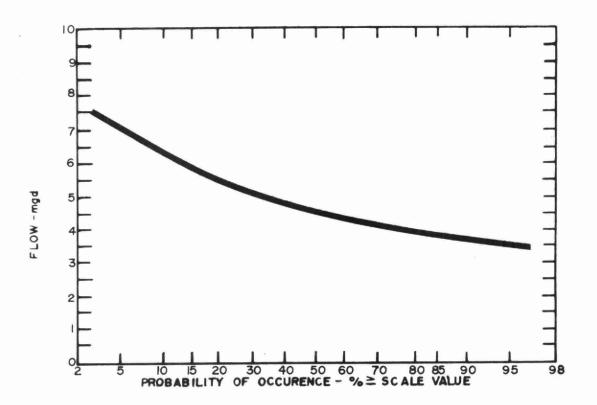
# Monthly Operating Costs

мочтн	TOTAL EXPEND TURE	PAYROLL	CASU4L PAYROLL	FUE_	POWER	CHEMICALS	GENERAL SUP-CLES	EQUIPMENT	PEPA PS on the MAINTEN/ N° :	SUNDRY #	₩AT ER	TRAVEL
JAN	7338.18	6163,31	-	847.22	289.74	_	-	_	-	37.91	-	-
FEB	7303,25	3520.59	-	844.07	463.78	-	639,31	3.00	645.55	1117.05	-	69.90
MAR	8469, 35	3872.35	-	747.55	405.58	-	383,24	-	214.85	2845.78	-	-
APR	1031 <b>5.</b> 30	4465.48	370.82	686.12	424.55	2131.50	347.88	-	80.55	1808.40	-	-
MA*	7933,54	4447.84	785.16	669.34	583.92	-	539.70	118.58	630.33	158.67	-	-
JUNE	12841.19	4790.61	803.50	696.70	468.72	-	709.90	617.72	780,12	3326.69	647,23	
JULY	9908.62	4062.14	883.19	431.13	509.73	-	340.24	-	614.68	2346.61	720.90	-
AUG	10966.36	6122.19	1236.98	-	545.44	-	275.50	-	392.09	2384.51	9.65	-
SEPT	13871,85	4177.04	719, 25	892.84	624.40	1048.11	648.87	(89, 25)	1380.90	4438.34	31,35	-
ост	7206.62	4152.41	390.08	-	443.25	-	328.25		762,28	1108.64	21.71	-
NOV	6911.92	4198.01	195.04	1315.05	521.09	-	150.73	4.25	162.33	176.25	189.17	-
DEC	18456.51	4325.06	-	812.58	491.90	-	886.70	45.15	168.02	11641.67	85.43	-
TOTAL	121522.69	54297.03	5384.02	7942.60	5772.10	3179.61	5250.32	699, 45	5831.70	31390.52	1705.44	69.90

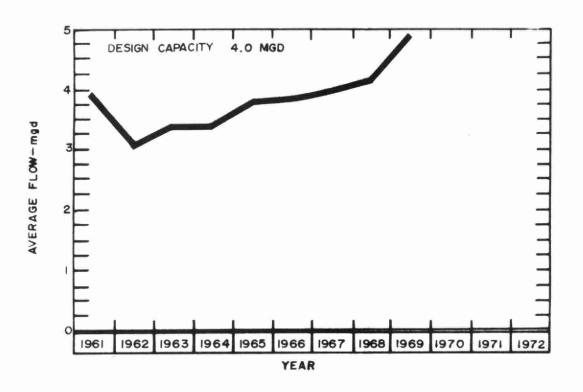
BRACKETS INDICATE CREDIT

\* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$24506.70

PROCESS DATA	
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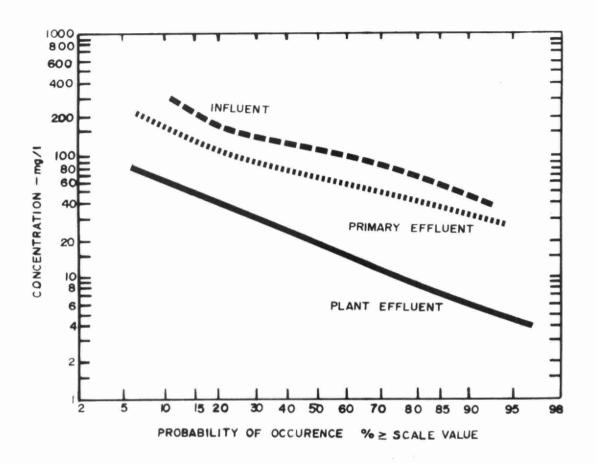
# FLOWS



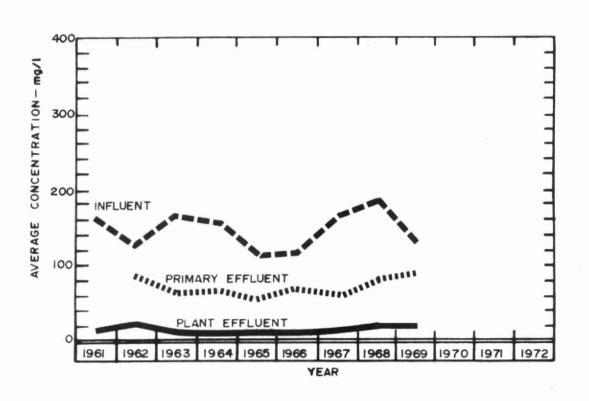
# **PLANT FLOWS and CHLORINATION**

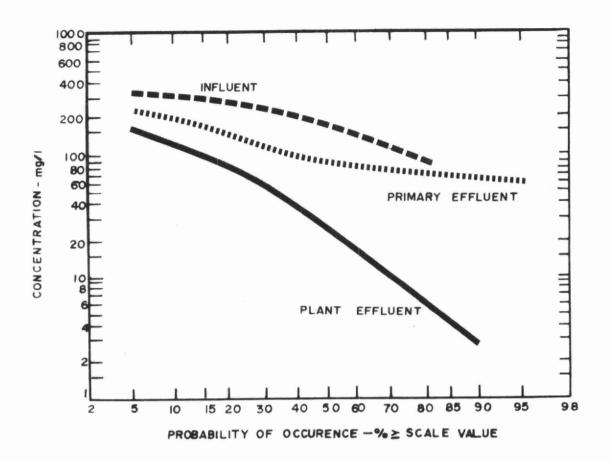
MONTH	TOTAL FLOW	AVERAGE DAILY FLOW	MAXIMUM DAILY FLOW	MINIMUM DAILY FLOW	CHLORINE USED	DOSAGE
	mil gal	mil gal	mil gal	mil gal	10 pounds	mg/I
JAN	112.5	3.6	4.2	3.1	0	-
FEB	103.1	3.7	4.4	3.1	0	-
MAR	122.1	3.9	6.0	2.6	0	-
APR	193.9	6.5	9.1	4.5	÷	-
MAY	189.1	6.1	8.2	3.9	+	-
JUNE	164.8	5.5	6.0	4.4	+	-
JULY	153.6	5.0	6.2	3.8	+	-
AUG	142.3	4.6	7.0	3.7	F	-
SEPT	127.7	4.3	5.6	3.5	ł-	-
ост	158.7	5.1	8.9	3.5	+	- <b>-</b>
NOV	182.6	6.1	11.1	5.0	0	-
DEC	126.8	4.1	4.9	2.6	0	-
TOTAL	1777.2	_	-	-	4,000	-
AVERAGE	-	4.9	7	-	-	-

<sup>+</sup> Chlorination

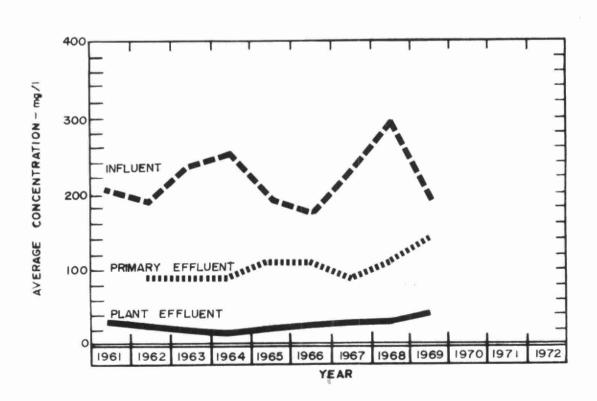


# BIOCHEMICAL OXYGEN DEMAND





# SUSPENDED SOLIDS

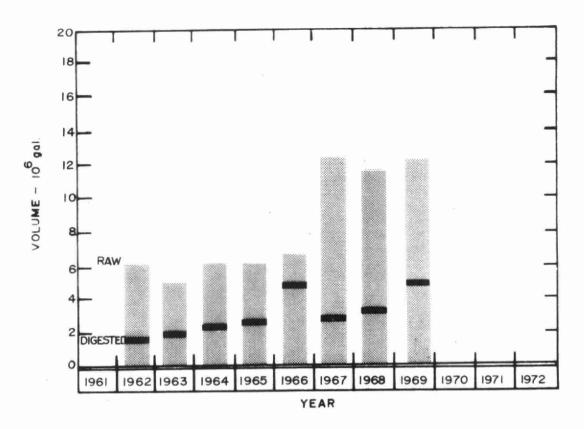


## **PLANT EFFICIENCY**

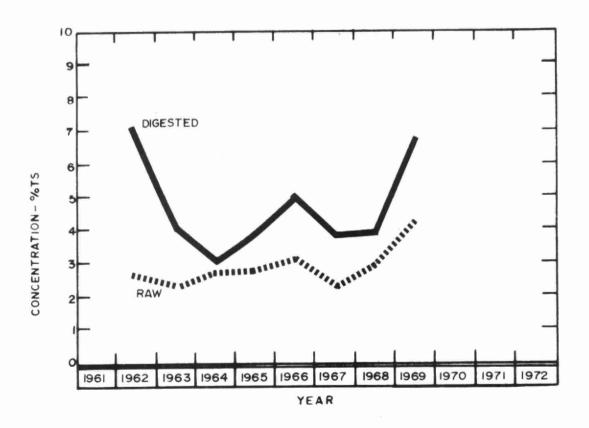
	BIOCH	HEMICA	L OXYG	EN DEMAND		SUSPE	NDED S	OLIDS	GRIT	
MONTH	INF.	EFF.	REDUCTION		INF.	INF. EFF. REDUCTION				
MONTH	mg/l	mg/l	%	10 <sup>5</sup> pounds	mg/I	mg/I	%	10 <sup>5</sup> pounds	cu ft	
JAN	220	6	97	2.4	330	10	97	3.6	565	
FEB	-	-	-	-	-	-	-	-	538	
MAR	130	6	95	1.5	270	5	98	3.2	760	
APR	-	-	-	-	-	-	-	-	592	
MAY	140	10	93	2.5	290	20	93	5.1	608	
JUNE	79	5	93	1.2	157	10	94	2.4	518	
JULY	80	26	21	.8	160	55	66	1.6	380	
AUG	77	22	71	.8	140	90	36	.7	717	
SEPT	120	32	73	1.1	165	80	51	1.1	412	
ост	75	9	88	1.0	100	10	90	1.4	360	
NOV	100	30	70	1.3	90	50	44	.7	318	
DEC	225	56	75	2.1	230	100	57	1.6	502	
TOTAL	-	-	-	-	-	-	-	-	-	
AVERAGE	125	20	84	1.5	193	43	77	2.1	521	

### **AERATION**

		AERATI	ON INF.	SECOND	Y. EFF.				
MONTH	AVG DAILY	BOD	SS	BOD	ss	MLSS	F/M	AIR USED	WASTE
MONTH	FLOW	800	CONCN	800	CONCN	CONCN	IB BOD	1000 cu ft	SLUDGE
	mil gal	mg/l	mg/l	mg/I	mg/I	mg/l	Ib MLSS	IB BOD	Ib/DAY
JAN	3.6	200	400	6	10	1520	. 44	.28	-
FEB	3.7	-	-	-	-	1320	-	-	-
MAR	3.9	110	150	6	5	1270	.31	1.14	-
APR	6.5	-	-	-	-	950	_	-	-
MAY	6.1	90	210	10	20	1040	. 48	. 96	-
JUNE	5.5	52	77	5	10	1650	.15	1.81	-
JULY	5.0	60	120	26	55	1950	.14	2.78	-
AUG	4.6	36	75	22	90	1240	.13	7.29	-
SEPT	4.3	57	90	32	80	780	. 29	4.39	-
ост	5.1	70	90	9	10	1200	. 27	1.50	-
NOV	6.1	50	90	30	50	3890	.21	3, 85	-
DEC	4.1	155	110	56	100	1700	.33	1.16	-
TOTAL	-	-	-	-	-	-	-	-	4 -
AVERAGE	4.9	88	141	20	43	1550	.28	2.52	-



# DIGESTION



# SLUDGE DIGESTION and DISPOSAL

	RAW	SLUDGE	Ξ	DIGEST	ED SLU	JDGE	SUPERN	ATANT	SLUDGE	DISPOSAL
MONTH	VOLUME	TOTAL	1	VOLUME	TOTAL		VOLUME	TOTAL	LIQUID	DEWATERED
	10 <sup>6</sup> gal	%	%	10 <sup>6</sup> gal	%	%	IO gal	%	cu yd	cu yd
JAN	1.12	-	-	.24	-	-	-	-	1439	-
FEB	1.01	-	-	.29	-	-	-	-	1725	-
MAR	1.33	-	-	.41	-	-	-	-	2427	-
APR	1.30	-	-	.37	-	-	-	-	2177	-
MAY	1.34	5.6	61	.33	9.6	60	-	-	1978	-
JUNE	1.29	4.9	62	.39	8.9	74	-	-	2294	-
JULY	1.34	2.7	-	.41	4.0	-	-	_	2397	-
AUG	1.34	-	-	.41	-	-	-	-	2402	-
SEPT	1.30	1.7	-	.12	7.4	30	-	-	724	-
ост	* .78	.3	-	.51	3.8	-	-	-	3036*	-
NOV	* 0	8.3	64	.77	-	-	-	-	4588*	-
DEC	* 0	5.3	-	.31	-	-	-	-	1864*	-
TOTAL	12.15	-	1	4.56	-	-	_	-	27051	-
AVERAGE	1.01	4.1	62	.38	6.7	54	-	-	2254	-

<sup>\*</sup> Cleaning digester

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